

Naval Facilities Engineering Command Ergonomic Risk Assessment Branch Medical Clinic

Introduction

This report summarizes the ergonomic risk assessment conducted at the Branch Medical Clinic in June of 2004. The clinic was observed in order to determine sources of ergonomic stress and recommend improvements. This assessment is based upon interviews with supervisor, Industrial Hygienist, Safety Petty Officer, and employees as well as an evaluation by the Naval Facilities Engineering Command (NAVFACENGCOM) Hazard Abatement Ergonomist.

The clinic operations were observed in order to determine sources of ergonomic stress and make recommendations to reduce the risk of work-related musculoskeletal disorders (WMSDs) and improve safety, health and productivity. Musculoskeletal Disorders (MSDs) are injuries and illnesses that affect muscles, nerves, tendons, ligaments, joints, spinal discs, skin, subcutaneous tissues, blood vessels, and bones. Work-Related Musculoskeletal Disorders (WMSDs) are:

- ∞ Musculoskeletal disorders to which the work environment and the performance of work contribute significantly or
- ∞ Musculoskeletal disorders that are aggravated or prolonged by work conditions.

Recommendations to the command to further reduce the probability of injury include new equipmentⁱ and administrative controlsⁱⁱ. Recommendations are included with as much vendor informationⁱⁱⁱ as possible to assist in the evaluation of products and services. Input gathered from the workers, safety specialists, and other personnel to evaluate equipment before purchasing is recommended. This process will increase product acceptance, test product usability and durability, and take advantage of employee experience.

The command may request additional funds from the Chief of Naval Operations (CNO) Hazard Abatement (HA) Program to abate the risk of injury. Naval Facilities Engineering Command (NAVFACENGCOM) manages the CNO Hazard Abatement Program, which is a centrally managed fund to correct safety and health deficiencies beyond the funding capabilities of the activity. Information about the HA program can be found on the Naval Facilities Engineering Command web site www.navfac.navy.mil/safety and in OPNAVINST 5100.23F. Ch 12 Hazard Abatement.

Patient Treatment

Purpose of the Operation: Responsible for providing patients with medical care including routine medicine, minor surgery, and acute care.

Population: 23 active duty and civilian personnel in addition to visiting doctors

Injury Data: There have been no reported injuries.

Description of the Operation: Health professionals care for patients in treatment rooms as well as an acute care area with a loading/unloading area for ambulances. While providing treatment, the medical practitioners are continually in awkward back postures leaning over patients and records.

The current gurney and wheelchairs are not safe for the patients or hospital staff. On occasion the wheelchair tires have reportedly fallen off, figure 1, and the gurney rails and bed, figure 2, doesn't safely lock into place. Care givers tend to overcompensate for the equipment shortcomings by exerting greater push forces and awkward postures.



Figure 1: Wheelchair



Figure 2: Gurney

Ergonomic issue description:

Health professionals perform repetitive work in awkward postures while treating patients. Possible excessive forces can result from equipment malfunctions.

Repetitive Motion and Awkward Postures:


Health care professionals repetitively bend over patients and records placing strain on the lower back and spine. Static awkward postures (called "static loading") occur while maintaining an awkward position (bending over charts/patients), which can restrict blood flow and can cause muscle fatigue.

Excessive Force:

Exerting high forces can contract muscles to their maximum capability and strain tendons which leads to fatigue and possible damage to the muscles and other tissues. A serious traumatic injury could also occur to the patient or caregiver if the equipment (wheelchair or gurney) were to fail.

Recommendations

- ∞ Four treatment stools would allow the caregivers to interact with patients from a supported neutral position. Refer to Table 1 for more information.
- ∞ Two wheelchairs are recommended to improve patient safety and reduce force exerted by the caregiver when transporting patients. Refer to Table 2 for product information.
- ∞ A gurney of appropriate size and capacity would improve patient and caregiver safety. Refer to Table 2.



Table 1: Stools				
Description	Vendor	Product	Estimated Cost	Figure
Stools	Alimed	2966Advantage Surgeon's Chair JA93-1001	\$2,495 (chair) \$599 (armrests)	

	Hag www.haginc.com Ken Krauss/Bonnie Momsen Chicago, IL (312)321-0761	Hag Capisco*	\$442	
Stool	ErgoResource Charles Hartman (919) 661-0300 (GSA Contract)	Hag Capisco*- Vinyl Cover Seat Height Adjusts from 16” to 20” Seat Height adjusts from 20” to 27” (ideal for bench work)	\$436.25 \$445.74	
	Cessi Ergonomics 410-315-9360	AbStool *refer to figures 3 and 4	\$336	



Figure 3 and 4: Capisco chair being straddled for dental work
The Capisco and AbStool can be straddled and used to support the chest and upper extremities. The Capisco has a large range of adjustability and could be used as a laboratory stool. Both chairs can be obtained from a local sales representative for product trial.

Table 2: Wheelchairs and Gurneys				
Description	Vendor	Product	Estimated Cost	Figure

Gurney	Styker Medical 616-329-2100	Gurneys vary by capacity and function.	Call for pricing	
Wheelchair	Alco Wheelchairs and Accessories 1-800-323-4282	Wheelchairs	\$150- \$1000	
	Edmond Wheelchair 1-888-343-2969	Standard Folding Wheelchairs	\$150- \$250	
	Wheelchairs 4 Less 1-800-710-4964	Standard Folding Wheelchairs	\$150- \$750	

Pharmacy

Purpose of the Operation: Prepare prescriptions for patients

Population: 1 Pharmacist and 2 Technicians- active duty

Injury Data: There have been no reported injuries.

Description of the Operation: Pharmacists and technicians fill about 700 prescriptions each day. Pre-prepared and hand-filled items are bagged and sealed for each patient. Pills are counted by hand or by machine. Compounds are hand mixed a few times each day. When the customer approaches the window the employee takes their medical information and payment method and delivers the prescription. For safety reasons the customer window is separated from the employee. The employee has to reach 41” to deliver the prescription.

Employees stand for long periods of time on the computer, at the customer window, and at the work areas used for preparing orders. Employees noted pain and discomfort in their feet and back associated with standing.



Figure 5: Pharmacist reaching to deliver order

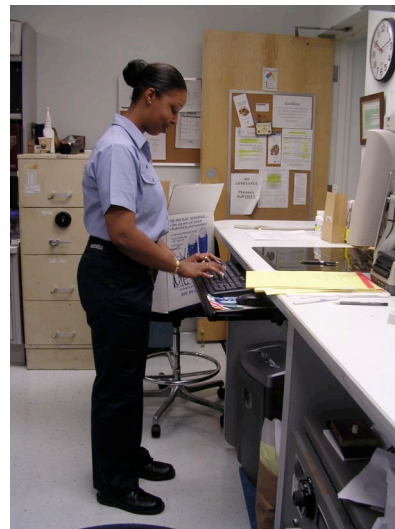


Figure 6: Pharmacist standing at workstation

Ergonomic issue description:

Pharmacy employees suffer aching feet and back pain from prolonged standing. Excessive reaching to the customer window places strain on upper extremities and back.

Awkward Postures:

Extended reaches to the customer window can place stress on the lower back as well as the shoulders and arms.

Prolonged Standing:

Standing for long periods can be a strenuous activity that promotes blood pooling in the legs and feet and can result in discomfort and fatigue.

Recommendations

- ∞ One long anti-fatigue mat with beveled edges will help reduce pain and discomfort associated with prolonged standing. Peaklogix (703-819-6061) quoted a 24"x20' anti-fatigue mat for \$625 including shipping.
- ∞ A chute or manual trolley system to deliver patients orders will reduce employee bending while still maintaining a customer-friendly non-automated environment. Anteon manufacturing has been asked to deliver a quote.

Laboratory Testing

Purpose of the Operation: Perform laboratory work for the clinic

Population: Two active duty employees

Injury Data: There have been no reported injuries.

Description of the Operation: Employees perform laboratory tests such as evaluating sediment in urine samples. The microscopes are used for laboratory tests roughly 20-30 times each day. Each test requires approximately 2-3 minutes of microscope use. The microscope workstation is also used for storage which prevents the worker from getting closer to the workstation. The microscope controls are located about 14” from the front edge of the desk. Employees can sit or stand at the workstation but usually prefer to stand to get closer to the microscope.



Figure 7 and Figure 8: Viewing samples through microscope at lab testing station

Ergonomic issue description:


Microscope use causes awkward sustained postures.

Awkward and Sustained Postures:

Microscopes are generally designed to maximize viewing capabilities rather than user comfort. Ergonomic stressors associated with microscope use include neck inclinations, bent back postures, non-neutral arm positions, wrist deviations, and contact stress to the forearms and elbows. Sustained postures require continual muscle contractions which prevent the muscles from receiving oxygen and nutrients and can cause lactic acid buildup. Sustained awkward postures can cause fatigue and discomfort and place the employee at risk of developing WMSDs.

Recommendations

- ∞ An adjustable height workstation with a cutout will allow the employees to get closer to the microscope. Storage shelves will allow for employees to maintain space and allow more room around the microscope.

Table 3: Microscope Table				
Description	Vendor	Product	Estimated Cost	Figure
Microscope Table	Third and Fourth Microscope Service John Massey 217-425-2657	Microscope Table	Contact vendor for pricing	

Offices

Purpose of the Operation:

Employees in accounting, health benefits, patient registration as well as the medical professionals use computer workstations to perform their job.

Population: 23 active duty and civilian personnel in addition to visiting doctors

Injury Data: There have been no reported injuries.

Description of the Operation: Employees use computer workstations to enter patient information, make medical appointments, administer health benefits, etc. The clinic serves about 15,000 patients a year.



Figure 9: Twisting to talk to a client



Figure 10: Desk doesn't fit the user



Figure 11: Twisting the body

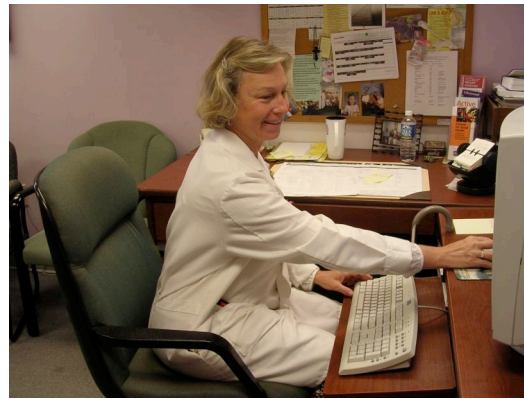


Figure 12: Reaching for a mouse

The greatest ergonomic stressors in this area are awkward postures and contact stress. Because of the desk depth, the monitors are positioned off center, figures 9-12. The workers are required to twist their neck or torso to view the monitor. Even when the monitors are centered, the user has to twist his/her neck to speak with a client, figure 9.

Workers also rest their forearms on the edge of the desk when typing because the workstation encourages a non-neutral wrist posture and the chairs are not very adjustable. Resting forearms on the edge of a desk causes contact stress. Workers are also reaching for their mice because there isn't enough room next to the keyboard for the mouse. Mousing on a higher surface is also causing contact stress to the wrist and arm.

Ergonomic Issue Description:

The greatest ergonomic stressors in the office areas are awkward postures and contact stress. The combination of two physical risk factors and frequency of exposure induces the risk of WMSDs.

Awkward Postures: Workers spend a large percentage of their time with the neck and or torso twisted. These postures are examples of awkward postures. Repeatedly performing tasks in such positions imposes increased stress on the joints and/or spinal discs.

Contact Stress: The workstation design is the cause of the contact stress. Workers are resting palms and forearms on the sharp desk edge. Sustained contact stress may lead to a number of WMSDs due to tendon irritation and reduction in nerve conduction.

Recommendations: All vendor information is included in Table 4

- ∞ Provide separate computer workstation or a larger overall workstation to accommodate the computer and support equipment.
 - An optimally designed computer workstation is a height adjustable desk or keyboard tray so the keyboard is positioned at a height equivalent to the worker's seated elbow height.
 - The workstation should be of adequate size to accommodate equipment (telephone, monitor) and materials (documents). If there is not sufficient room for a larger desk then a flat panel monitor should be considered.
 - A sit/stand adjustability feature allows the worker to change postures throughout the day, from sitting to standing. Changing posture reduces fatigue by allowing the muscles of the back to rest while standing, and the muscles of the legs to rest while seated

- ∞ An alternative to providing new workstations:
 - The workstation should be adjusted such that the keyboard and mouse heights are equivalent to the worker's seated (or standing) elbow height with the upper arms perpendicular and forearms parallel to the floor and wrist straight. The keyboard and monitor are directly in front of the worker. If this is done by raising a chair, then a footrest should be provided.
 - A monitor arm will give the user greater flexibility in positioning the monitor directly in front of the user while maintaining some desk space.
 - A flat panel monitor will allow the users to comfortably use the existing furniture and reduce twisting of the back and neck.

- ∞ Currently most of the users don't have room for their mouse next to the keyboard. There are a number of solutions for this situation. No one device is the best solution or can be learned by everyone; therefore, employees should be allowed to try different devices.
 - A mouse bridge can be placed over the numeric keypad to position the mouse closer to the worker.
 - A trackball and glidepad are options that uses less space than a conventional mouse. Thumb-operated trackballs are typically not recommended. Office supply stores carry a variety of input devices for employees to try.

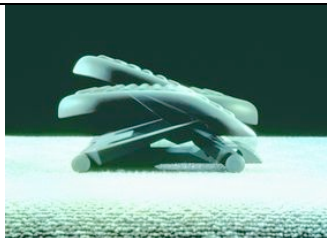

- ∞ Provide a headset for the telephone if the user receives frequent or long phone calls or if the workers use the telephone and computer at the same time. Employees should not cradle the phone between the head and shoulder. Work with your telecommunications provider to acquire headsets that are compatible with your phone system.

- ∞ The current chairs are not adjustable and don't provide sufficient back support. New adjustable chairs would allow the users to raise their chairs to the height of






the keyboard and mouse and utilize the back support. Temporary back support can be provided with lumbar cushions.




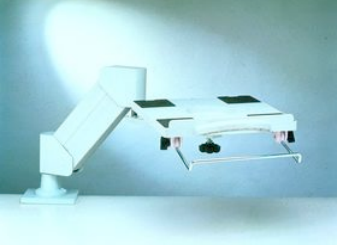
- ∞ Copy stands and read/write stands allow the employee to angle reference materials and medical records towards themselves to avoid neck and back flexion. These stands decrease the amount of repetitive neck motion associated with looking from a document on a flat surface to a computer monitor. Document holders should ideally be located as close to the monitor as possible, next to or below the monitor. Copy stands are used when documents are solely being typed from. Read/write stands are for when documents are being typed from and written on.
- ∞ The Navy Ergonomics Webpage contains a presentation on how to properly set up a computer workstation and a checklist for evaluating computer workstations. Refer to www.navfac.navy.mil/safety and click on Ergonomics.
- ∞ Most vendors have trial periods for products. Before buying office supplies see if a vendor will lend the product for trial or if the vendor has a return policy.
- ∞ Certain ergonomic office products can improve productivity as well as employee comfort. Suggested products include automatic staplers and 3-hole punches, ergonomic staple removers, and wide-body pens.

Table 4: Workstation Accessories

Description	Vendor	Product	Estimated Cost	Figure
Footrests	Alimed www.alimed.com	Comfort Tread Plus Footrest #JA73454	\$42.95	
	North Coast Medical 1-800-277-6826	WorkMod Tall Foot Rest NC73650	\$34.95	

	ErgoSource 1-952-404-1969 www.ergosource.com	Self-Adjusting Foot Rest SAF3 3" Deck Height	\$18.95	
Adjustable workstations	Alimed 1-800-225-2610 www.alimed.com Balt Inc. 1-800-749-2258 www.baltinc.com Lab Safety 1-800-356-0783 www.labsafety.com Ergo Science Ergosci.com ErgoCentrix Ergocentrix.com Work-rite (on GSA) www.wrea.com		\$500-\$1,600 Prices vary with options	
Keyboard Trays	Alimed	EZTouch Lever Free Keyboard Tray	\$207	
	Work-rite	Banana Board keyboard for mousing on the left or right	Contact for GSA pricing	

	GSA Advantage	GSA item CI-810-REF	\$111	
Seating	HAG www.haginc.com Steelecase www.steelcase.com Neutral Posture www.neutralposture.com	5300 or 5400 Criterion Model 5500	GSA Pricing*: \$483-\$516 GSA Pricing*: \$391.00 GSA Pricing*: \$455-515	
Lumbar Cushion	Alimed Office Supply Store	Lumbar Cushion	\$15-\$100	
Document Holder	GSA Alimed	VuRyte GSA Item: VUR14LDS VuRyte Copy Holder	\$28 \$40	
	Office Supply Stores	Document Holder	\$5-\$20	

	Office Supply Stores	Copy Holder	\$10 at OfficeMax	
Mouse Bridge	Alimed GSA	Mouse Bridge Ergonomic Design MBO1	\$20 \$14	
Monitor Arm	GSA	Ergonomic Concepts Monitor Arm GSA Item: ECI-449-BT-S	\$208	
	Alimed	VersaTech Monitor Arm	\$200	

ⁱ Equipment purchase without proper and repeated training will not mitigate risk and may in fact increase hazards.

ⁱⁱ Administrative controls are management-controlled work practices and policies designed to reduce exposures to work-related musculoskeletal disorders (WMSDs) hazards by changing the way work is assigned or scheduled. Administrative controls reduce the exposure to ergonomic stressors and thus reduce the cumulative dose to any one worker. Examples of administrative controls that are used in the ergonomics context are employee rotation, employer-authorized changes in the pace of work, and team lifting.

ⁱⁱⁱ This report does not constitute an endorsement of any particular product. Rather, it is a recitation of how Navy personnel have addressed a particular work place safety issue. Neither the Navy nor its employees and agents warrant any product described in this report for any use, either general or particular.